

REMARKS

This responds to the Office Action mailed on December 14, 2004.

Claim 1 is amended, claims 14-22 are canceled, and no claims are added; as a result, claims 1-13 are now pending in this application.

Affirmation of Election

Restriction to one of the following claims was required:

- I. Claim 1-13, drawn to a method for manufacturing an interconnected circuit board assembly; and
- II. Claims 14-22, drawn to other method for manufacturing an interconnected circuit board assembly and an electronic system.

As provisionally elected by Applicants' representative, Sherry Schumm on December 7, 2004, Applicants elect to prosecute the invention of Group I, claims 1-13.

The claims of the non-elected invention, claims 14-22, are hereby canceled. However, Applicants reserve the right to later file continuations or divisions having claims directed to the non-elected inventions.

§102 Rejection of the Claims

Rejection of claims 1 and 4-9:

Claims 1 and 4-9 were rejected under 35 USC § 102(b) as being anticipated by Leicht et al. (U.S. 5,551,627). Applicant has amended claim 1, from which claims 4-9 depend, to more clearly distinguish Applicant's claims from that which is disclosed by Leicht et al. Accordingly, Applicant respectfully traverses the rejection.

Leicht et al. disclose a method for forming an electronic assembly 100 (Fig. 1) that includes a grid array package 106 mounted on a printed circuit board 108 with multiple solder connection structures 101. (see Fig. 1 and col. 2, line 64 through col. 3, line 9). A solder connection structure 201 includes a spherical preform 210 of a metal alloy and a pair of fillets 212, 214 attached to the spherical preform 210 and to faying surfaces 202, 204 of the grid array package 206 and the circuit board 208, respectively. (see Fig. 2 and col. 4, lines 4-34).

The solder connection structure is formed by depositing a solder paste 312 on the faying surface of the grid array package 206, moving the spherical preform 210 into contact with the solder paste 312, and then reflow heating the assembly to melt the solder paste 312. (see Fig. 3-1 and col. 4, line 62 through col. 5, line 12). After cooling, a second solder paste 314 is disposed on the faying surface 204 of the circuit board 208, the spherical preform 210 is moved into contact with the solder paste 314, and the assembly is again reflow heated to melt the solder paste 314. (see Fig. 3-2 and col. 5, lines 33-43).

Applicant's claims include at least the following features, which distinguish Applicant's claims from that which is disclosed by Leicht et al.:

“... aligning the first circuit board with the second circuit board by engaging the spacers with openings in the second circuit board so that one or more second bond pads of the second circuit board align with the one or more first bond pads, and the one or more second bond pads make electrical contact with the one or more spacers . . .”

Support for the amendment to claim 1 may be found in the specification at Figs. 2, 4, and 8; page 9, line 26 through page 10, line 2; and page 11, lines 18-23.

Nowhere do Leicht et al. disclose the feature of claim 1, or the claims that depend therefrom, of aligning circuit boards by engaging spacers with openings in a circuit board. Accordingly, Applicant's claims are distinguishable from that which is disclosed by Leicht et al. For these reasons, Applicant believes that the rejection of claims 1 and 4-9 under 35 USC 102(b) as being allegedly anticipated by Leicht et al. has been overcome. Applicant respectfully requests that the rejection of claims 1 and 4-9 under 35 USC §102(b) be reconsidered and withdrawn.

Rejection of claims 1 and 10-13:

Claims 1 and 10-13 were also rejected under 35 USC § 102(b) as being anticipated by Marrs (U.S. 5,795,818). Applicant has amended claim 1, from which claims 10-13 depend, to more clearly distinguish Applicant's claims from that which is disclosed by Marrs. Accordingly, Applicant respectfully traverses the rejection.

Marrs discloses a method for forming an integrated circuit chip to substrate connection. A passivation layer is added to the surface of a wafer, and the passivation layer 199 is patterned to expose a bonding pad 204. (see Fig. 2 and col. 5, lines 31-37). Ball bond bumps 202 are formed on the bonding pads 204. (see Fig. 3 and col. 5, lines 41-52). After coining, the ball bond bumps 312 are placed in contact with metallization 502 on an upper surface 501A of a substrate 501, and a combination of heat and pressure causes a weld to form between the coined ball bond bumps 312 and the metallization 502. (see Fig. 7, col. 9, lines 25-32).

Applicant's claims include at least the following features, which distinguish Applicant's claims from that which is disclosed by Marrs:

“... aligning the first circuit board with the second circuit board by engaging the spacers with openings in the second circuit board so that one or more second bond pads of the second circuit board align with the one or more first bond pads, and the one or more second bond pads make electrical contact with the one or more spacers . . .”

Nowhere does Marrs disclose the feature of claim 1, or the claims that depend therefrom, of aligning circuit boards by engaging spacers with openings in a circuit board. Accordingly, Applicant's claims are distinguishable from that which is disclosed by Marrs. For these reasons, Applicant believes that the rejection of claims 1 and 10-13 under 35 USC §102(b) as being allegedly anticipated by Marrs has been overcome. Applicant respectfully requests that the rejection of claims 1 and 10-13 under 35 USC §102(b) be reconsidered and withdrawn.

§103 Rejection of the Claims

Claims 2 and 3 were rejected under 35 USC § 103(a) as being unpatentable over Leicht et al. Applicant respectfully traverses the rejection.

As stated above in the response to the 35 USC §102(b) rejection that cites Leicht et al., Applicant believes that claim 1, from which claims 2 and 3 depend, is distinguishable over that which is disclosed in Leicht et al. Accordingly, Applicant believes that the rejection of claims 2 and 3 is moot in light of the amendment to claim 1 and the remarks, stated above.

Further, Applicant believes that a *prima facie* case of obviousness has not been established. To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference must teach or suggest all the claim limitations.

In the Office Action, there is not given any suggestion or motivation, in the reference itself or in the knowledge generally available to one of ordinary skill in the art, to modify the reference. The Office Action alleges that it would have been an obvious matter of design choice to choose any methods to form the spacers using selective electroplating process and attaching the spacers to bonding pads by welding. Applicant is assuming that the Examiner is relying on “common knowledge” in making this rejection. However, no evidentiary support has been provided in conjunction with this rejection. Accordingly, Applicant’s believe that the rejection is not appropriate. In the event that the rejection is repeated, Applicant requests that the Examiner provide such evidentiary support.

Applicant believes that there is no reasonable expectation of success. Leicht et al. is very clear in specifying that its preform 210 is spherical. (see, e.g., Figs. 1-5 and col. 4, lines 15-17). A spherical structure would not be formable using an electroplating process (claim 2), nor would it be reliably weldable to a bond pad (claim 3). Accordingly, Applicant disagrees with the Office Action allegation that it would have been an obvious matter of design choice to choose any methods to form the spacers using selective electroplating process and attaching the spacers to bonding pads by welding.

For these reasons, Applicant believes that a *prima facie case* of obviousness has not been established, and that claims 2 and 3 are patentable over Leicht et al. Accordingly, Applicant respectfully requests that the rejection of claims 2 and 3 under 35 USC §103(a) be reconsidered and withdrawn.

Conclusion

Applicant respectfully submits that the claims are in condition for allowance and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicant's attorney Sherry Schumm at (480) 538-1735 or Applicant's below-named representative at (612) 349-9592 to facilitate prosecution of this application.

If necessary, please charge any additional fees or credit overpayment to Deposit Account No. 19-0743.

Respectfully submitted,

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By their Representatives,

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Date March 14, 2005

By Ann M. McCrackin

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CERTIFICATE UNDER 37 CFR 1.8: The undersigned hereby certifies that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail, in an envelope addressed to: MS Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on this 14th day of March 2005.

Dennis J. Kempf

Name

[Signature]

Signature